

FLORA AND PHYTOGEOGRAPHY OF THE CAÑÓN DE ITURBIDE, NUEVO LEÓN, MEXICO

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ABSTRACT

The Cañón de Iturbide comprises folded mountains of sedimentary origin located in the Sierra Madre Oriental physiographic province in southeastern Nuevo León, and northeastern Mexico, in the Iturbide, Galeana, and Linares municipalities. This well preserved forest area has been considered by Arriaga-Cabrera et al. (2000) as the Priority Terrestrial Region 82. A floristic survey was conducted to provide a vouchered vascular plant list along with vegetation types of this important conservation area. In 30 sampling points, we recorded 113 families, 410 genera, and 768 taxa, (698 species and 70 infraspecific taxa). From this total, 128 species belong to the family Asteraceae, 99 to Fabaceae, and 55 to Poaceae. The phytogeography of the area corresponds mainly to neotropical, nearctic, and autochthonous species from arid lands, based on Rzedowski's (1962, 1978) classification. According to a cluster analysis and dendrogram, based on presence-absence of species, five main groups of plant associations are recognized: xeric scrublands, oak-pine forest (with different plant associations), piedmont scrub, Tamaulipan thorn scrub and agricultural lands (Miranda & Hernández 1963; Rzedowski 1978).

KEY WORDS: Cañón de Iturbide, flora, phytogeography, northeast Mexico

RESUMEN

El área denominada Cañón de Iturbide es un conjunto de sierras plegadas de origen sedimentario situadas en la región fisiográfica de la Sierra Madre Oriental al sureste del estado de Nuevo León y noreste de México, la cual abarca los municipios de Iturbide, Galeana y Linares. Esta zona boscosa, bien conservada, ha sido considerada por Arriaga-Cabrera et al. (2000), como la Región Terrestre Prioritaria 82. La presente investigación consistió en la exploración de dicho sitio para hacer un reconocimiento taxonómico de las especies de flora vascular que componen sus tipos de vegetación. En 30 puntos de muestreo estratificado fueron registradas 113 familias, 410 géneros y 768 taxones (698 especies y 70 taxones intraespecíficos). De este total, 128 pertenecen a la familia Asteraceae, 99 a Fabaceae y 55 a Poaceae. La fitogeografía del área corresponde principalmente a especies neotropicales, neárticas y autóctonas de zonas áridas, en base a la clasificación de Rzedowski (1962, 1978). De acuerdo con el análisis de conglomerados y el dendrograma basado en la presencia-ausencia de especies, se reconocen cinco grupos principales de asociaciones vegetales: matorrales xerófilos, bosques de encino y pino (con diferentes asociaciones vegetales), matorrales submontanos, matorral espinoso tamaulipeco y tierras agrícolas (Miranda y Hernández 1963; Rzedowski, 1978).

PALABRAS CLAVE: Cañón de Iturbide, flora, fitogeografía, Noreste de México

INTRODUCTION

The Cañón de Iturbide area is located at the Gran Sierra Plegada in the State of Nuevo Leon and ranges from 700 to 2,900 m in elevation. The area is covered by forests and shrublands, in relatively good condition, and whose floristic components have not been studied deeply. The National Commission for the Knowledge and Use of Biodiversity (CONABIO) has designated it as the Priority Terrestrial Region 82. It represents an important area in the corridor of the Sierra Madre Oriental, connecting the preserved forests for the transit of carnivorous species such as black bear (*Ursus americanus*), cougar (*Puma concolor*), jaguar (*Panthera onca*), and jaguarundi (*Puma yagouaroundi*). It also serves as a migration corridor to the maroon-fronted parrot (*Rhynchopsitta terrisi*) which is endemic to the northern Sierra Madre Oriental. This study aims to contribute to the knowledge of the regional flora and its origin.

METHODS

Study area

The study was carried out in the Priority Terrestrial Region 82 (Arriaga-Cabrera et al. 2000). It embraces a surface area of 42,200 ha (Fig. 1) and is located at 24°40'19"–24°55'43"N and 99°45'36"–99°59'50"W. Its geology is constituted mainly of sedimentary calcareous, folded, anticlinal and synclinal rock layers from the upper cretaceous (Rzedowski 1978), giving rise to steep sierras with narrow central valleys. The dissolution of the rock by water has formed narrow canyons within the Cañón de Iturbide study area such as El Potosí, Jaures, Caribeño, Venado, Cañón Seco, Las Monedas, Pablillo, and La Escondida, as well as several important mountains, such as Sierra La Muralla, Sierra Borrada, Sierra Cieneguita, Sierra El Gabacho, Sierra El Novillo, and Sierra Santa María (INEGI 1986, 2010). The area is part of the San Fernando-Soto la Marina hydrographic region, in the Río San Fernando hydrographic subregion, and the Río Conchos-Chorreras basin (CONAGUA 2007). The climate varies from warm (low parts) to temperate (higher parts), and from wet to dry, in this case from East to West respectively. Climatic differences are caused by the Sierra Madre Oriental rising from the Llanura Costera del Golfo Norte (Gulf Coastal Plain) toward the Altiplano Mexicano (Mexican Plateau), producing a condensation effect, that generates rains in the eastern slope of the mountain chains where fog occurs commonly, while the western slopes develop a "rain shadow" with dry or semi-dry climate, forming low forest of oaks, known also as chaparral. The study area has three main climate types: (A)C(w₁) or semiwarm-subhumid, C(w₀) or temperate subhumid, and BS1h(x') or semiarid-temperate (García 1998). The main soils of the area are shallow lithosols, limited in depth to 10 cm above bedrock (FAO-UNESCO 1988). The main vegetation types are mixed forest (*Quercus-Pinus*), conifer forest (*Pinus*), broad leaf forest, piedmont scrub, xerophilous scrublands, and chaparral (Alanís 2004; Velazco 2009).

Field and lab work

Thirty sample sites representing all the plant communities previously recognized were randomly selected and georeferenced. Plant specimens were collected from July 2011 to April 2012. All specimens were deposited in herbarium in the Faculty of Forest Sciences, Linares, Nuevo León, Mexico (CFNL). Taxa were identified using several floristic studies for the area or near it as well as monographs for most genera (Banda 1974; Briones 1991; Estrada 2007; Estrada et al. 2012; González 1972, 2003; Hernández 1998; Luna et al. 2004; Martínez & Díaz Salas 1995; González-Medrano 1972; Mickel & Smith 2004; Puig 1991; Rojas 1965; Velazco 2009; Villarreal & Estrada 2008). We also consulted and used the databases for the CFNL herbarium, Hinton Herbarium (Galeana, N.L.), and TEX/LL, (Austin, Texas).

Sampled sites were compared according to their plant diversity. A species matrix based on presence (1)-absence (0) data was used for comparison among sites using Sørensen Similarity Coefficient (Mueller-Dumbois & Ellenberg 1974) by means of the polythetic agglomerative technique (Gauch 1982; Manly 1990) and the UPGMA method was used for cluster analysis, using the MVSP Package (KCS 2005). Vegetation types are according to Miranda & Hernández-Xolocotzi (1963) and Rzedowski (1978). Floristic affinities are according to (Rzedowski 1962, 1978), Hernández-Xolocotzi (1953), Briones (1991), and García (2009).

RESULTS AND DISCUSSION

Floristic composition

A total of 113 families, 410 genera, 698 species, and 70 infraspecific taxa of vascular plants were recorded. (Table 1, Appendix). Families with the highest number of genera, highest number of species, and genera with the highest number of species are shown in Tables 2, 3, and 4, respectively. Seven of the families (6%) include 43% and 49% of the genera and species, respectively, while the twelve most diversified genera include 23% of the total genera. The Magnoliophyta are the most common plants in Cañón de Iturbide, while Coniferophyta and Cycadophyta are the less diversified groups. The Asteraceae, Fabaceae, and Poaceae families are the most diversified families, and *Desmodium* (13), *Euphorbia* (12), *Dalea* (9), and *Quercus* (10) stand out as the most diversified genera.

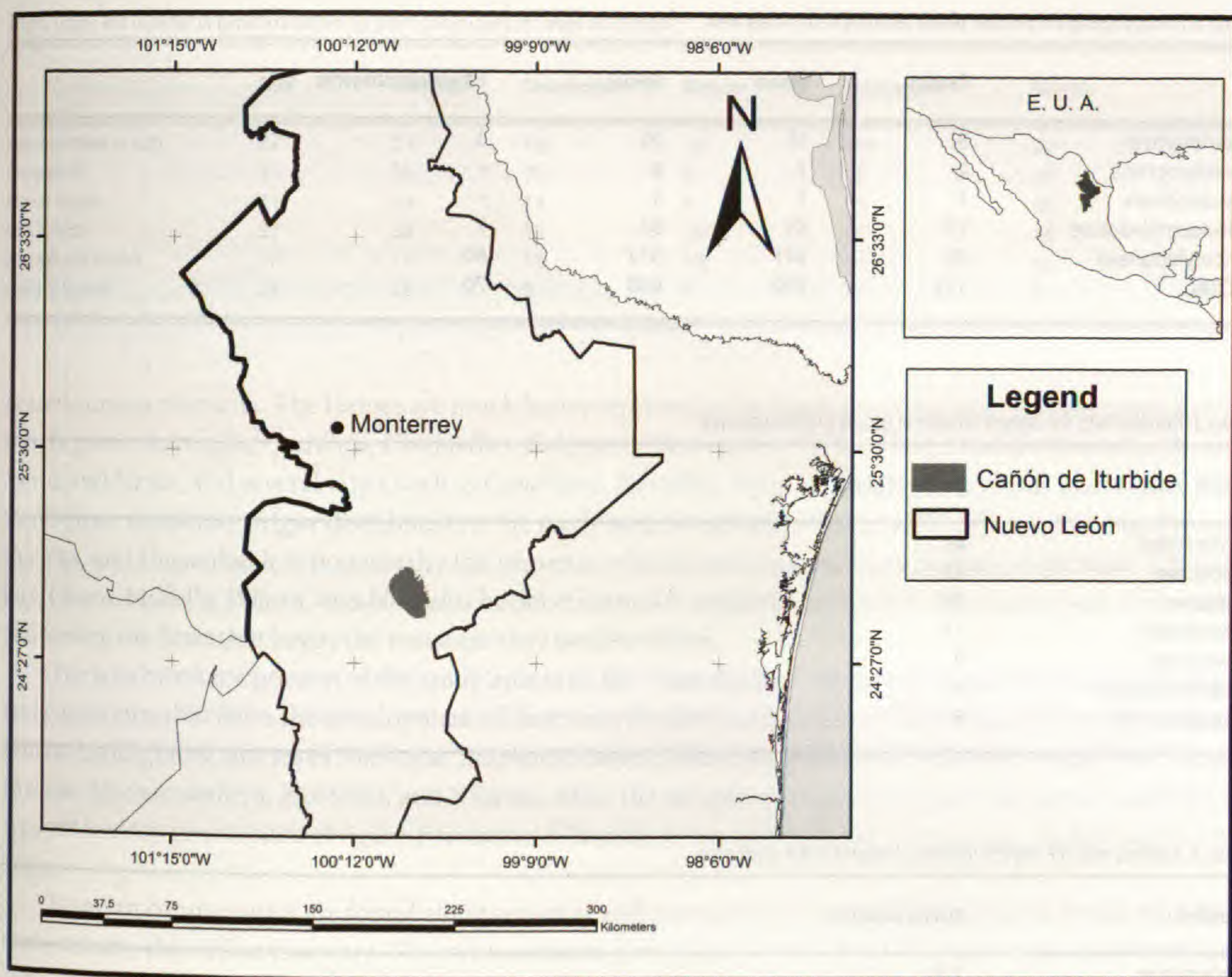


FIG. 1. Study area of Cañón de Iturbide, Nuevo Leon, Mexico.

Origin of the flora and phytogeography

The most common genera in the study area are from arid areas of the world and from Tropical America (Table 5). The piedmont scrub community contains the highest number of genera. This type of vegetation is located in lower parts of the area, at the foot of the mountains, in transition with Tamaulipan thorn scrub, and it is common to find genera from warm areas such as *Acacia*, *Bauhinia*, *Berberis*, *Zanthoxylum*, *Ehretia*, and *Phoebe*, as well as those belonging to the American tropics such as *Acaciella*, *Casimiroa*, *Caesalpinia*, *Amyris*, *Condalia*, *Cordia*, *Decatropis*, *Esenbeckia*, *Eysenhardtia*, *Gochnatia*, *Helietta*, *Persea*, and *Schaefferia*. Commonly found herbaceous species are *Abutilon*, *Acalypha*, *Indigofera*, *Waltheria*, *Phyllanthus*, *Priva*, *Tragia*, *Capsicum*, *Course-tia*, *Gilia*, *Lantana*, *Mimosa*, *Passiflora*, and *Verbesina*.

Several genera with nearctic and temperate affinity are most commonly found in the oak-pine forests and chaparral communities, in the highest parts of the mountains and in the western flanks, where it is common to find *Pinus* and *Quercus* as the dominant tree layer elements, associated with shrubby genera such as *Juniperus*, *Fraxinus*, *Cercis*, *Ceanothus*, *Prunus*, *Crataegus*, *Garrya*, and *Juglans*, while the herbaceous layer is mainly represented by *Aster*, *Conopholis*, *Hedeoma*, *Hymenoxys*, *Asclepias*, *Centaurium*, *Evolvulus*, *Hackelia*, *Packera*, *Parthenocissus*, *Philadelphus*, *Tagetes*, *Taraxacum*, *Urtica*, *Vitis*, *Artemisia*, and *Eryngium*, among others. Also, in the Chaparral community, *Quercus* is the genus dominant in the shrub layer, along with several genera of Rosaceae typical of temperate and dry areas such as *Amelanchier*, *Cercocarpus*, *Cowania*, *Crataegus*, *Vauquelinia*, and *Lindleya*.

The pure oak forests found in the study area have an important mix of neotropical elements followed by

TABLE 1. Principal groups of vascular plants recorded in the study area.

	Families	Genera	Species	Intraspecific categories
Pteridophyta	8	15	25	3
Coniferophyta	2	2	8	-
Cycadophyta	1	1	1	-
Monocotyledonae	17	51	92	7
Dicotyledoneae	85	341	572	60
TOTAL	113	410	698	70

TABLE 2. Families with the highest number of genera in the study area.

Family	Number of genera
Asteraceae	63
Fabaceae	41
Poaceae	28
Malvaceae	11
Cactaceae	9
Euphorbiaceae	9
Boraginaceae	8

TABLE 3. Families with the highest number of species in the study area.

Families	Number of species
Asteraceae	128
Fabaceae	99
Poaceae	54
Cactaceae	26
Euphorbiaceae	26
Malvaceae	20
Solanaceae	17

TABLE 4. Genera with the highest number of species in the study area.

Genera	Number of species
<i>Desmodium</i>	13
<i>Euphorbia</i>	12
<i>Quercus</i>	10
<i>Dalea</i>	9
<i>Ageratina</i>	8
<i>Agave</i>	7
<i>Brickellia</i>	7
<i>Rhus</i>	7
<i>Erigeron</i>	6
<i>Ipomoea</i>	6
<i>Mimosa</i>	6
<i>Muhlenbergia</i>	6

TABLE 5. Origin and number of genera recorded by plant community in Cañón de Iturbide.

	Calid	Temperate	Cosmopolitan	Mexican	Neotropical	Nearctic
Submontane scrub	87	21	18	10	101	42
Chaparral	15	39	10	2	14	47
Mixed forest	21	65	18	6	27	39
Oak forest	57	58	19	10	69	40
Xerophytic scrub	16	15	13	18	17	35
Gallery Forest	24	24	9	1	12	9

nearctic origin elements. The former are much better represented in the herbaceous layer by the genera *Ageratina*, *Begonia*, *Bouvardia*, *Castilleja*, *Cheilanthes*, *Cologania*, *Desmanthus*, *Desmodium*, *Mimosa*, *Phaseolus*, *Rivina*, *Salvia*, and *Stevia*, and several vines such as *Gonolobus*, *Ibervillea*, *Matelea*, *Melothria*, *Serjania*, and *Smilax*. Elements from temperate origin distributed in the study area are *Arbutus*, *Carya*, *Celtis*, *Cercis*, *Pistacia*, *Prunus*, *Quercus*, and *Ungnadia*. It is noteworthy the presence of ferns such as *Adiantum*, *Anemia*, *Asplenium*, *Cheilanthes*, *Llavea*, *Mildella*, *Pellaea*, and *Pleopeltis* because many are epiphytes adapted to live on the bark of the oaks and among the litter that keeps the moisture they need to thrive.

The southwestern portion of the study area is in the "rain shadow" of the sierra and shows evident semi-arid conditions that favor the development of desert scrub plant communities, which include mostly nearctic genera, highlighting species of *Ambrosia*, *Baccharis*, *Bahia*, *Bouteloua*, *Dasyilirion*, *Dyssodia*, *Lesquerella*, *Leucophyllum*, *Machaeranthera*, *Mortonia*, and *Nissolia*. Also, the xerophytic vegetation hosts the greater number of typical Mexican genera such as *Agave*, *Ferocactus*, *Glandulicactus*, *Mammillaria*, *Thelocactus*, *Turbinicarpus*, and *Yucca*.

Riparian communities are found along seasonal and permanent rivers and also in some creeks with seasonal streams that retain moisture. The most common genera from warm-areas found in these ecosystems are *Commelina*, *Cyperus*, *Digitaria*, *Oplismenus*, and *Paspalum*, but also present are genera with cosmopolitan distributions such as *Apium*, *Eleocharis*, *Lobelia*, *Rumex*, and *Samolus*, and even genera from temperate origin such as *Arundo*, *Astranthium*, *Coriandrum*, *Equisetum*, *Geranium*, *Iris*, *Rorippa*, *Seymeria*, and *Talinum*. The most evident and distinctive genera in the tree layer of the riparian areas are *Platanus*, *Salix*, and *Sambucus*.

According to the cluster analysis and the dendrogram (Fig. 2), based on presence-absence of species, five main groups of plant associations are recognized: xeric scrublands, oak-pine forest (with different plant associations), piedmont scrub, Tamaulipan thorn scrub and agricultural lands (Rzedowski 1978; Miranda & Hernández 1963).

Group I includes three sites located at xeric scrubland at an elevation of 1310 to 1500 m and is represented by the presence of the species *Acacia berlandieri*, *A. roemeriana*, *Agave lecheguilla*, *A. striata*, *Berberis trifoliolata*, *Echinocereus platyacanthus*, *Euphorbia antysiphilitica*, *Ferocactus hamatacanthus*, *Fraxinus greggii*, *Gochnatia hypoleuca*, *Jatropha dioica*, *Opuntia engelmannii*, *Prosopis laevigata*, *Tecoma stans*, and *Yucca filifera*.

Group II is a heterogeneous complex of sites where oaks and pines are the dominant elements at an elevation of 600 to 2000 m; however, it shows floristic differences. It includes six subgroups of plant associations.

Subgroup IIA includes two sites dominated by 10–15 m tall pure oak-pine temperate forests at an elevation of 1000 m. The dominants include *Quercus affinis*, *Q. canbyi*, *Q. laceyi*, *Q. polymorpha*, *Pinus cembroides*, *P. pseudostrobus*, associated to *Carya ovata*, *Cercis canadensis*, *Juglans mollis*, *Juniperus deppeana*, *Pistacia mexicana*, and *Verbesina olsenii*. **Subgroup IIB**, made up of five sites (elevation of 1100 to 1500 m) and consists of a semi-dry oak scrubland in transition with pine forest. Subgroup IIB is similar to the Subgroup IIA but with a greater number of Rosaceae species. The dominant species in this subgroup are *Amelanchier denticulata*, *A. paniculata*, *Amyris madrensis*, *Buddleja cordata*, *Ceanothus fendleri*, *C. greggii*, *Dalea capitata*, *D. melantha*, *D. lutea*, *Juniperus angosturana*, *J. flaccida*, *Lindleya mespilioides*, *Pinus cembroides*, *P. pseudostrobus*, *Pistacia mexicana*, *Quercus fusiformis*, *Q. galeanensis*, *Q. laeta*, *Q. microlepis*, *Q. sideroxyla*, *Q. striatula*, and *Rhus virens*. These sites are

eguilla, *Comarostaphylis polifolia*, *Croton ciliato-glandulifer*, *Dasyllirion berlandieri*, *Juniperus deppeana*, *O. engelmannii*, *Painteria eleachistophylla*, *Pistacia mexicana*, *Tecoma stans*, *Vauquelinia corymbosa* ssp. *heterodon*, and *Yucca treculeana*. **Subgroup IIF** included two sites of pure oak forest located at 750 to 950 m and is dominated by *Dioon angustifolium* in the lower strata and by *Juglans mollis*, *Esenbeckia berlandieri*, *Quercus canbyi*, and *Q. rizophylla* in the higher strata. Some epiphytes were also recorded such as *Tillandsia bartramii*, *T. recurvata*, and *T. usneoides*.

Group III includes six sites reaching 600 to 1100 m along the Cabezones-Potosi canyon, showing a 4–5 m tall piedmont scrub physiognomy with abundant thorny and non-thorny species. Several species are characteristic of this plant community, highlighting species of the genera *Acacia*, *Bauhinia*, *Buddleja*, *Celtis*, *Cercis*, *Colubrina*, *Cordia*, *Decatropis*, *Diospyros*, *Ebenopsis*, *Ehretia*, *Erythrina*, *Esenbeckia*, *Havardia*, *Helietta*, *Phoebe*, *Ungnadia*, and *Zanthoxylum*, but also, when adjacent riparian habitats, they share several species such as *Adiantum capillus-veneris*, *Cyperus minimae*, *C. odoratus*, *C. thyrsoflorus*, *Equisetum hyemale*, *Lobelia cardinalis*, *Platanus rzedowskii*, *Rorippa nasturtium-aquaticum*, *Sambucus nigra* ssp. *canadensis*, *Salix jaliscana*, and *S. nigra*, as the most evident.

Group IV includes four sites located at medium altitudes ranging from 1500 to 1530 m in agriculture lands in Laguna de Santa Rosa, and adjacent to the semi-dry oak scrubland. It is dominated by weed species in the herbaceous strata such as *Abutilon hypoleucum*, *Alternanthera caracasana*, *Amaranthus hybridus*, *Ambrosia psilostachya*, *Anagallis arvensis*, *Anoda cristata*, *Astragalus hypoleucus*, *Argemone mexicana*, *Bidens ferulifolia*, *Boerhavia anysophylla*, *Bouchetia erecta*, *Cirsium vulgare*, *Calyptocarpus vialis*, *Dyssodia papposa*, *Gaura coccinea*, *Helianthus annuus*, *Ipomoea coccinea*, *Kallstroemia parvifolia*, *Lactuca serriola*, *Meximalva filipes*, *Nicotiana trigonophylla*, *Oenothera rosea*, *Parthenium incanum*, *Ricinus communis*, *Solanum eleagnifolium*, *Taraxacum officinale*, *Urtica chamaedryoides*, *Verbena carolina*, and *Zinnia peruviana*.

Finally, **Group V** corresponds to a single site in the lowest part of the study area ranging from 600 to 650 m on the boundary with Tamaulipan thorny scrub. This group shows species not found in the other site's samples such as *Acacia amentacea*, *Acaciella angustissima*, *Bernardia myricifolia*, *Caesalpinia mexicana*, *Capsicum annuum* var. *minus*, *Canavallia villosa*, *Celtis laevigata*, *C. pallida*, *Colubrina greggii*, *Croton cortesianus*, *C. fruticosus*, *Diospyros texana*, *Ehretia anacua*, *Hibiscus martianus*, *Karwinskia humboldtiana*, *Randia rhagocarpa*, and *Schaefferia cuniefolia*.

Endemism and protection status

The study area hosts at least five endemic species for Nuevo León Mexican state: *Notholaena leonina*, living in oak-pine forests, in the Cañón Arroyo Seco; *Verbesina olsenii*, inhabiting mainly oak forest, adapted to live in moist ravines, near the Caracol Waterfall; *Anoda leonensis*, inhabiting piedmont scrub in transition to oak forests, at La Palma and Cañón El Caribeño; *Thelocactus tulensis*, recorded in the rosetophyllous desert scrub, found in dry slopes of mountains, near the town Potrero Prieto; and *Cardamine auriculata*, inhabiting the piedmont scrub near Cañón El Caribeño. In addition *Dioon angustifolium*, is narrowly endemic to the mountains of Iturbide and Linares counties in Nuevo León, and to the Sierra de San Carlos, Tamaulipas (Astorga et al 2005). Also, as part of this work, a new Asteraceae species was discovered: *Verbesina lanulosa* (in press), which lives in the transition between the piedmont forest and oak forests near the settlement of La Salitrera. The new species was recorded in the piedmont scrub on rocky hillsides, with high sun exposure. From the total species known for this area we recorded seven species protected by Mexican laws (NOM - 059 SEMARNAT 2010) (Table 6).

CONCLUSIONS

The heterogeneous topography and climates over all the study area allow for the development of rich plant diversity as well as contrasting plant communities and different life forms. The plains, mountains, creeks, and cliffs create different and variable ecosystems that are home to countless species of very different origins. The classification of vegetation allowed us to recognize different patterns of plant association based on plant diversity. The most diverse plant vegetation types were the oak and the oak-pine forest, although in this plant community were more sampling sites, our results agree with those of Estrada (2007), who found that of all sampled

TABLE 6. Species protected by Mexican law in the study area.

Species	Protection Status
<i>Agave bracteosa</i> S. Watson ex Engelm.	Endemic and threatened
<i>Brahea berlandieri</i> Bartlett	Endemic and special protection
<i>Dioon angustifolium</i> Miq.	Endemic and endangered
<i>Echinocactus platyacanthus</i> Link & Otto	Endemic and special protection
<i>Litsea glauscecens</i> Kunth	Non endemic and endangered
<i>Pinus strobiformis</i> Engelm.	Non endemic and special protection
<i>Thelocactus tulensis</i> (Poselger) Britton & Rose	Endemic and threatened

vegetation types (which are close to our study area), mixed forests of oak and conifer always kept greater diversity of species. Nearby areas with similar plant communities are found in the south of Nuevo Leon (Cerro Peña Nevada) and Tamaulipas (Sierra de San Carlos), and both of them contain shrub and forest communities. In Peña Nevada, Moreno-Talamantes (2012) recorded 485 taxa, most of them of nearctic origin, while in the Sierra de San Carlos, Martinez (1995) recorded 676 taxa, most of them from neotropical origin: The Cañón de Iturbide shares strong similarities with both of them, but its flora is richer in diversity since it has all ecosystems found in both areas, and it can be highlighted as an area for conservation of its plant diversity and its endemism. Five endemic species in the State of Nuevo Leon were recorded in the area: *Anoda leonensis*, *Cardamine auriculata*, *Dioon angustifolium*, *Notholaena leonina*, *Thelocactus tulensis*, and *Verbesina olsenii*. From the 768 taxa recorded, seven of them are protected by NOM 059-SEMARNAT-2010: *Agave bracteosa*, *Brahea berlandieri*, *Dioon angustifolium*, *Echinocactus platyacanthus*, *Litsea glauscecens*, *Pinus strobiformis*, and *Thelocactus tulensis*. The discovery of a new species, *Verbesina lanulosa* (in press), in this area shows that still more botanical work is necessary to complete the floristic studies of northeastern Mexico. The plant diversity recorded in the Cañón de Iturbide includes genera and species from different origins, but the tropical elements are quantitatively the most important ones, since they represent about 52% of families, 68% of genera, and 32% of the species, and they are well represented in the different plant communities, especially piedmont scrub, oak forest, and oak-pine forests.

APPENDIX

Floristic list of the Cañón de Iturbide, Nuevo Leon, Mexico. All specimens are deposited in the Herbarium CFNL (Linares, Nuevo Leon, Mexico).

PTERIDOPHYTA

Anemiaceae

Anemia mexicana Klotzsch, E.E. 21049, 21219.

Aspleniaceae

Asplenium resiliens Kunze, M.S. 59.

Equisetaceae

Equisetum hyemale L. var. *affine* (Engelm.) A.A. Eaton, E.E. 21846.

Ophioglossaceae

Botrychium schaffneri Underw., M.S. 1374.

Polypodiaceae

Pleopeltis polylepis (Roem ex. Kunze) T. Moore var. *erythrolepis* (Weath.) T. Wendt, E.E. 21880.

Pleopeltis polypodioides (L.) E.G. Andrews & Windham var. *michauxianum* (Weath) E.G. Andrews & Windham, E.E. 21206; M.S. 497.

Pleopeltis thyssanolepis (A. Braun ex Klotzsch) E.G. Andrews & Windham, M.S. 732.

Pteridaceae

Adiantum capillus-veneris L. E.E. 21435, 21888.

Adiantum tricholepis Fée, E.E. 21209, 1257.

Astrolepis integerrima (Hook.) D.M. Benham & Windham E.E. 21181, 21622.

Astrolepis sinuata (Lag. ex Sw.) D.M. Benham & Windham M.S. 14, M.S. 474

Cheilanthes alabamensis (Buckley) Kunze, E.E. 21599

Cheilanthes bonariensis (Willd.) Proctor E.E. 21180.

Cheilanthes leucopoda Link, E.E. 21860.

Cheilanthes microphylla (Sw.) Sw., E.E. 21145, 21210, 21604.

Llavea cordifolia Lag., E.E. 21138, 21504, 21626, 21904.

Mildella fallax (M. Martens & Galeotti) G.L. Nesom E.E. 21120.

Notholaena bryopoda Maxon, E.E. 21051.

Notholaena leonina Maxon, E.E. 21228.

Notholaena standleyi Maxon, M.S. 1413.

Pellaea atropurpurea (L.) Link, E.E. 21153.

Pellaea microphylla Mett. ex Kuhn, M.S. 52.

Pellaea ovata, (Desv.) Weath. E.E. 21859.

Pteridium aquilinum (L.) Kuhn, E.E. 21502, 21887.

Pteridium caudatum (L.) Maxon, M.S. 1618.

Selaginellaceae

Selaginella lepidophylla (Hook. & Grev.) Spring, E.E. 21075, 21610.

Selaginella pilifera A. Braun, E.E. 21076, 21244, 21881.

Thelypteridaceae*Thelypteris puberula* (Baker) C.V. Morton, M.S. 1094.**GYMNOSPERMAE****Cupressaceae***Juniperus angosturana* R.P. Adams., M.S. 309.*Juniperus depeanna* Steud., E.E. 21667.*Juniperus flaccida* Schlttdl., E.E. 21624.**Pinaceae***Pinus cembroides* Zucc., E.E. 21603.*Pinus greggii* Engelm. ex Parl., M.S. 1459.*Pinus pseudostrobus*, Lindl. E.E. 20894, 260.*Pinus strobiformis* Engelm., M.S. 1403.*Pinus teocote* Schlttdl. & Cham, M.S. 261.**Zamiaceae***Dioon angustifolium* Miq., E.E. 21233, 238.**MONOCOTYLEDONEAE**
(16 families and 50 genera)**Agavaceae***Agave americana* L., M.S. 636, 674, 677.*Agave americana* L. ssp. *protoamericana* Gentry, M.S. 731.*Agave bracteosa* S. Watson ex Engelm., M.S. 1505.*Agave lecheguilla* Torr., M.S. 240.*Agave gentry* B. Ullrich, M.S. 713.*Agave scabra* Ortega, E.E. 21621, 957.*Agave striata* Zucc. M.S. 743.*Yucca filifera* Chabaud, M.S. 654.*Yucca linearifolia* Clary, M.S. 1476.*Yucca treculeana* Carrière, M.S. 632.**Alliaceae***Allium kunthii* G. Don, M.S. 1171.**Amaryllidaceae***Zephyranthes drummondii* D. Don, E.E. 21913.**Anthericaceae***Echeandia flavescens* (Schult. & Schult. f.) Cruden, M.S. 883.*Echeandia mexicana* Cruden, M.S. 1514.**Araceae***Xanthosoma robustum* Schott, M.S. 232.**Arecaceae***Brahea berlandieri* Bartlett, M.S. 1110.*Brahea dulcis* (Kunth) Mart, E.E. 21273a.**Bromeliaceae***Hechtia podantha* Mez, M.S. 1246.*Tillandsia bartramii* Elliott, E.E. 21196, 21743.*Tillandsia parryi* Baker, E.E. 21222.*Tillandsia recurvata* (L.) L., E.E. 21098.*Tillandsia usneoides* (L.) L., E.E. 21235.**Commelinaceae***Commelina erecta* L., E.E. 21923.*Commelina tuberosa* L., E.E. 21087.*Tradescantia crassifolia* Cav. M.S. 55.*Tradescantia pringlei* S. Watson, M.S. 1288, M.S. 1558.**Cyperaceae***Carex spissa* L.H. Bailey var. *ultra* (L.H. Bailey) Kük, E.E. 21897.*Carex schiedeana* Kunze, E.E. 21806.*Cyperus manimae* Kunth, E.E. 21239, 21266.*Cyperus odoratus* L., M.S. 1288.*Cyperus thyrsoflorus* Jungh., M.S. 1603.*Eleocharis montevidensis* Kunth E.E. 21812.**Hypoxidaceae***Hypoxis mexicana* Schult. & Schult., M.S. 1359.**Liliaceae***Calochortus barbatus* (Kunth) J.H. Painter, M.S. 1548.**Melanthiaceae***Schoenocaulon macrocarpum* Brinker, E.E. 21158.*Schoenocaulon texanum* Scheele, E.E. 21189.**Nolinaceae***Dasyllirion berlandieri* S. Watson, M.S. 785, M.S. 1018.*Dasyllirion leiophyllum* Engelm, ex Trel., M.S. 1018.*Dasyllirion texanum* Scheele, M.S. 865.**Orchidaceae***Malaxis fastigiata* (Rchb. f.) Kuntze, M.S. 297.*Mesadenus chiangii* (M.C. Johnst.) Garay, M.S. 1404.**Poaceae***Achnatherum eminens* (Cav.) Barkworth, M.S. 592.*Agrostis verticillata* Vill., E.E. 21869, 21885; M.S. 1412.*Andropogon scoparius* Michx., E.E. 21118.*Aristida pansa* Wootton & Standl., M.S. 27.*Aristida purpurea* Nutt. var. *purpurea*, E.E. 21047, 21052, 21058; M.S. 60.*Aristida roemeriana* Scheele, E.E. 21255; M.S. 1356.*Aristida schiedeana* Trin. & Rupr. var. *schiedeana*, M.S. 60.*Arundo donax* L., E.E. 21765.*Bothriochloa barbinodis* (Lag.) Herter, M.S. 1034.*Bothriochloa saccharoides* (Sw.) Rydb, M.S. 1169.*Bothriochloa laguroides* (DC.) Herter var. *laguroides*, M.S. 1605.*Bouteloua chondrosioides* (Kunth) Benth. ex S. Watson, E.E. 21055a.*Bouteloua curtispindula* (Michx.) Torr., E.E. 21437, 21926.*Bouteloua repens* (Kunth) Scribn. & Merr., E.E. 21199.*Bromus anomalus* Rupr. ex E. Fourn., M.S. 347.*Cenchrus incertus* M.A. Curtis, E.E. 21220.*Chloris submutica* Kunth, M.S. 1375.*Digitaria bicornis* (Lam.) Roem. & Schult. M.S. 1606.*Digitaria ciliaris* (Retz.) Koeler, E.E. 21152.*Digitaria cognata* (Schult.) Pilg., E.E. 21724.*Eleusine indica* (L.) Gaertn., M.S. 22.*Eragrostis cilianensis* (All.) Vignollo ex Janch., E.E. 21264, 21272.*Eragrostis intemredia* Hitchc., E.E. 21705.*Erioneuron nealleyi* (Vasey) Tateoka, M.S. 26.*Leptochloa dubia* (Kunth) Nees, M.S. 582.*Leptochloa fusca* (L.) Kunth, M.S. 583.*Leptochloa mucronata* (Michx.) Kunth, M.S. 584.*Melinis repens* (Willd.) Zizka, E.E. 21122, 21522, 21655.*Muhlenbergia dubia* E. Fourn., E.E. 21500.*Muhlenbergia lehmanniana* Henrard, E.E. 21174.*Muhlenbergia mexicana*, (L.) Trin., E.E. 21119.*Muhlenbergia pauciflora* Buckley, E.E. 21782.*Muhlenbergia repens* (J. Presl) Hitchc., M.S. 47.*Muhlenberia spiciformis* Trin., M.S. 1606.*Muhlenbergia tenuifolia* Kunth (Kunth), M.S. 1425.*Oplismenus hirtellus* (L.) P. Beauv. ssp. *hirtellus*, M.S. 235.*Oplismenus hirtellus* (L.) P. Beauv. ssp. *setarius* (Lam.) Mez ex Ekman, M.S. 257.*Panicum acuminatum* Sw., E.E. 21729, 21905.*Panicum bulbosum* Kunth, E.E. 21188.*Paspalum notatum* Alain ex Flügge, M.S. 3.*Paspalum publiflorum*, Rupr. ex E. Fourn., E.E. 21825.*Paspalum setaceum* Michx. var. *ciliatifolium* (Michx.) Vasey, M.S. 1585*Piptochaetium fimbriatum* (Kunth) Hitchc., M.S. 1532*Poa annua* L., E.E. 21441.

- Poa pratensis* L., M.S. 1321.
Setaria geniculata P. Beauv., E.E. 21443.
Setaria leucopila (Scribn. & Merr.) K. Schum. M.S. 20, 845.
Setaria parviflora (Poir.) Kerguelén, E.E. 21238.
Setaria viridis (L.) P. Beauv., E.E. 21438.
Sorghum halepense (L.) Pers., E.E. 21857.
Tragus berteronianus Schult., E.E. 21520.
Tridens pilosus (Buckley) Hitchc., E.E. 21057.
Tridens texanus (S. Watson) Nash, E.E. 21048.
Trisetum spicatum (L.) K. Richt., M.S. 1376.
Zea mays L., M.S. 1322.

Smilacaceae

- Smilax bona-nox* L., E.E. 21140.
Smilax lanceolata L., E.E. 21850.

Xanthorrhoeaceae

- Aloe vera* (L.) Burm. f., M.S. 209.
Asphodelus fistulosus L., E.E. 21601, 646.

DICOTYLEDONEAE
(85 families and 339 genera)

Acanthaceae

- Carlwrightia texana* Henrickson & T.F. Daniel, E.E. 21107, 21747; M.S. 210.
Dyschoriste decumbens (A. Gray) Kuntze, M.S. 8.
Dyschoriste linearis (Torr. & A. Gray) Kuntze var. *linearis*, M.S. 1043.
Dyschoriste poliodes Leonard & Gentry, E.E. 21692, 21834.
Dyschoriste schiedeana (Nees) Kuntze var. *schiedeana*, M.S. 1174, 1388.
Elytraria imbricata (Vahl) Pers., E.E. 21072, 21214.
Jacobinia incana (Nees) Hemsl., E.E. 21236; M.S. 248
Ruellia corzoi Tharp & F.A. Barkley, M.S. 534.
Ruellia nudiflora (Engelm. & A. Gray) Urb., E.E. 21674.
Ruellia occidentalis (A. Gray) Tharp & F.A. Barkley, E.E. 21237.
Siphonoglossa greggii Greenm. & C. H. Thomps., E.E. 21201, 21204.
Tetramerium nervosum Nees, E.E. 21060; E.E. 21259

Adoxaceae

- Sambucus nigra* L. ssp. *canadensis* (L.) R. Bolli, M.S. 1416.

Amaranthaceae

- Alternanthera caracasana* Kuntze, E.E. 21722; M.S. 1142.
Amaranthus hybridus L., E.E. 21780.
Iresine calea Standl., E.E. 21605.
Iresine cassiniiformis S. Schauer, E.E. 21745, 21855, 21903.
Iresine diffusa Humb. & Bonpl. ex Willd., E.E. 21170.

Anacardiaceae

- Pistacia mexicana* Kunth, E.E. 21211, 21596; M.S. 501
Rhus aromatica Aiton var. *trilobata* (Nutt.) A. Gray, E.E. 21901.
Rhus eximia (Greene) Standl., M.S. 273.
Rhus microphylla Engelm., E.E. 21771, 45.
Rhus pachyrrachis Hemsl., M.S. 267, 671.
Rhus radicans (L.) Kuntze, M.S. 248.
Rhus toxicodendron L. var. *quercifolia* Michx., M.S. 712.
Rhus virens Lindh. ex A. Gray var. *virens*, E.E. 21136, 21229, 21612.

Apiaceae

- Apium graveolens* L., E.E. 21442.
Coriandrum sativum L., M.S. 959, 1099.
Cyclosporum leptophyllum (Pers.) Sprague, E.E. 21912.
Donnellsmithia juncea (Humb. & Bonpl. ex Spreng.) Mathias & Constance, M.S. 1297.
Eryngium heterophyllum Engelm., M.S. 1451.
Tauschia aff. *bicolor* Constance & Bye, M.S. 1477.

Apocynaceae

- Apocynum cannabinum* L., M.S. 1421.
Asclepias angustifolia Schweigg., E.E. 21733, 21919.
Asclepias linaria Cav., E.E. 21797, 21820.
Asclepias linearifolia Pavon ex Decaisne in de Candolle pro syn., M.S. 1355.
Asclepias oenotheroides Schlttdl. & Cham, M.S. 1463.
Asclepias verticillata L., M.S. 1369.
Cynanchum barbigerum (Scheele) Shinnars, E.E. 21487.
Funastrum barbatum (Mart. ex E. Fourn.) Schltr., M.S. 1452.
Gonolobus gonoloboides (Greenm.) Woodson, M.S. 733, 906, 1095.
Mandevilla andrieuxii (Müll. Arg.) Hemsl., M.S. 1381.
Mandevilla karwinskii (Müll. Arg.) Hemsl., E.E. 21789.
Mateleia pilosa (Benth.) Woodson, M.S. 1480.
Mateleia reticulata (Engelm. ex A. Gray) Woodson, E.E. 21871.

Aquifoliaceae

- Ilex rubra* S. Watson, M.S. 282, 691.

Aristolochiaceae

- Aristolochia wrightii* Seem., M.S. 54.

Asteraceae

- Acourtia runcinata* (Lag. ex D. Don) B.L. Turner, E.E. 21616, 21619.
Ageratina espinosarum (A.Gray) R.M.RKing & H.RRob. var. *espinosarum*, E.E. 21788; M.S. 224.
Ageratina espinosarum (A.Gray) R.M. King & H. Rob. var. *subintegri-folia* A.Gray) R.M. King & H.RRob., M.S. 1607.
Ageratina havanensis (Kunth) R.M. King & H. Rob., E.E. 21858.
Ageratina nesomii B.L. Turner, M.S. 268a.
Ageratina petiolaris (Moc. ex DC.) R.M. King & H. Rob., M.S. 1529.
Ageratina saltillensis (B.L. Rob.) R.M. King & H. Rob., E.E. 21154, 21161.
Ageratina scorodonioides (A. Gray) R.M. King & H. Rob., M.S. 1608.
Ageratina viburnoides (DC.) R.M. King & H. Rob., E.E. 21481.
Ambrosia confertiflora DC., M.S. 376.
Ambrosia psilostachya DC., E.E. 21039, 21089
Aphanostephus ramosissimus DC., var. *ramosissimus*, E.E. 21708; M.S. 56.
Aphanostephus ramosissimus DC., var. *humilis* (Benth.) B.L. Turner & Birdsong, M.S. 1609.
Artemisia frigida Willd., M.S. 1431.
Aster asteroides (DC.) Kuntze, M.S. 590.
Astranthium splendens De Jong, M.S. 1554.
Baccharis pteronioides DC., M.S. 1433.
Baccharis salicina Torr. & A. Gray, E.E. 219121.
Bahia autumnalis Ellison, E.E. 21849, 21917.
Baltimora geminata (Brandege) Stuessy, M.S. 1572.
Barkleyanthus salicifolius (Kunth) H. Rob. & Brettell, M.S. 714.
Berlandiera lyrata Benth. var. *lyrata* Benth., E.E. 21142.
Berlandiera lyrata Benth. var. *macrophylla* A. Gray, M.S. 1410.
Bidens ferulifolia (Jacq.) DC., M.S. 1415.
Bidens aurea (Aiton) Sherff, M.S. 853.
Brickellia eupatorioides (L.) Shinnars var. *chlorolepis* (Woot. & Standl.) B.L. Turner, E.E. 21217.
Brickellia grandiflora (Hook.) Nutt., M.S. 574.
Brickellia laciniata A. Gray, M.S. 1173.
Brickellia lemmonii A. Gray var. *conduplicata* (B.L. Rob.) B.L. Turner, M.S. 1542.
Brickellia saltillensis B.L. Rob, M.S. 16.
Brickellia spinulosa (A. Gray) A. Gray, E.E. 21679.
Brickellia veronicifolia (Kunth) A. Gray, var. *petrophila* (B.L. Rob.) B.L. Rob, M.S. 161, 512.
Calyptocarpus vialis Less., E.E. 21263, 21615, 21658.
Chaetopappa bellioides (A. Gray) Shinnars, E.E. 21070, 21207, 21248.
Chaptalia texana Greene, M.S. 1464.

- Chrysactinia mexicana* A. Gray, M.S. 1426.
Chrysactinia truncata S. Watson, E.E. 21046.
Cirsium acrolepis (Petr.) G.B. Ownbey, M.S. 1547.
Cirsium pringlei (S. Watson) Petr., M.S. 1483, 1547.
Cirsium texanum Buckley, M.S. 1462.
Cirsium vulgare (Savi) Ten., M.S. 1083.
Dyssodia papposa (Vent.) Hitchc., M.S. 1518.
Dyssodia pinnata (Cav.) B.L. Rob., E.E. 21899, 21907.
Dyssodia pinnata (Cav.) B.L. Rob. var. *glabrescens* Strother, M.S. 1465.
Engelmannia pinnatifida Nutt., M.S. 1409.
Erigeron basilobatus S.F. Blake, M.S. 423.
Erigeron calcicola Greenm. M.S. 471.
Erigeron dryophyllus A. Gray, E.E. 21163.
Erigeron flagellaris A. Gray, M.S. 498.
Erigeron pulchellus Michx., M.S. 528.
Erigeron veracruzensis G.L. Nesom, E.E. 21128, 21177, 21183.
Gaillardia pulchella Foug., M.S. 1481.
Gnaphalium brachypterum DC., E.E. 21121.
Gnaphalium canescens DC., M.S. 311.
Gnaphalium chilense Spreng., M.S. 247, 453.
Gnaphalium flavocephalum G.L. Nesom E.E. 21131a.
Gnaphalium semiamplexicaule DC., M.S. 430.
Gochnatia hypoleuca (DC.) A. Gray, E.E. 21613, 21672.
Grindelia inuloides Willd. var. *inuloides*, M.S. 1041.
Grindelia microcephala DC., M.S. 1552.
Grindelia obovatifolia S.F. Blake, M.S. 1545.
Grindelia tenella Steyerl., M.S. 1555.
Gymnosperma glutinosum (Spreng.) Less., E.E. 21242, 21600.
Helenium amarum var. *badium* (A. Gray ex S. Watson) Waterf., M.S. 598.
Helenium quadridentatum Labill., M.S. 1544.
Helenium elegans DC. var. *amphilobum* (A. Gray) Bierner, M.S. 1447.
Helianthella gypsophila B.L. Turner var. *calcareia* B.L. Turner, M.S. 1586.
Helianthus annuus L., M.S. 1553.
Heterotheca mucronata Harm., M.S. 605.
Heterotheca subaxillaris (Lam.) Britton & Rusby, M.S. 1449.
Heterotheca villosa (Pursh) Shinnery, M.S. 1571.
Hieracium abscissum Less., E.E. 21124.
Hieracium mexicanum Less., M.S. 936.
Hieracium pringlei A. Gray, M.S. 9361408.
Hymenoxys insignis (A. Gray) Cockerell, M.S. 1084.
Hymenoxys linearifolia Hook. var. *linearifolia*, M.S. 1546.
Hymenoxys odorata DC., M.S. 1399.
Hymenoxys scaposa (DC.) K.F. Parker var. *argyrocaulon* K.F. Parker, M.S. 1084, 1470.
Koanophyllon galeana (B.L. Turner) B.L. Turner, E.E. 21127.
Lactuca serriola L., M.S. 862.
Loxothysanus pedunculatus Rydb., M.S. 1551.
Machaeranthera pinnatifida (Hook.) Shinnery, M.S. 61.
Machaeranthera scabrella (Greene) Shinnery, M.S. 1568.
Melampodium divaricatum (Rich. in Pers.) DC., M.S. 1585.
Melampodium perfoliatum (Cav.) Kunth, E.E. 21872.
Packeria tampicana (DC.) C. Jeffrey, M.S. 588.
Parthenium argentatum A. Gray, M.S. 1397.
Parthenium confertum A. Gray, M.S. 164.
Parthenium confertum A. Gray var. *lyratum* (A. Gray) Rollins, M.S. 1611.
Parthenium hysterophorus L., E.E. 21080.
Parthenium incanum Kunth, E.E. 22367.
Pinaropappus multicaulis Brandege, M.S. 978.
Pinaropappus roseus (Less.) Less., M.S. 19.
Polymnia uvedalia (L.) L., M.S. 1448.
Porophyllum ruderale (Jacq.) Cass., M.S. 400.
Roldana aschenborniana (S. Schauer) H. Rob. & Brettell, M.S. 308.
Roldana lobata La Llave, M.S. 823.
Sanvitalia ocymoides DC., M.S. 866.
Senecio coahuilensis Greenm., E.E. 21886.
Senecio sundbergii B.L. Turner, E.E. 21668.
Simsia amplexicaulis (Cav.) Pers., E.E. 21910.
Simsia calva (A. Gray & Engelm.) A. Gray, M.S. 1556.
Solidago altissima L., E.E. 21864.
Sonchus asper (L.) Hill, E.E. 21754, 21763.
Sonchus oleraceus L., M.S. 1224.
Stevia berlandieri A. Gray var. *berlandieri*, E.E. 21113.
Stevia micrantha Lag., M.S. 1319.
Stevia serrata Cav., M.S. 597.
Stevia pliosa Lag., M.S. 439.
Symphotrichum expansum (Poepp. ex Spreng.) G.L. Nesom, M.S. 1542.
Tagetes lucida Cav., M.S. 190.
Tamaulipa azurea (DC.) R.M. King & H. Rob., M.S. 587.
Taraxacum officinale L., M.S. 611, 990.
Thelesperma simplicifolium (A. Gray) A. Gray, M.S. 1469.
Thymophylla pentachaeta (DC.) Small, M.S. 375.
Thymophylla setifolia Lag., M.S. 1428.
Tridax procumbens L., E.E. 21117.
Tridax coronopifolia (Kunth) Hemsl., M.S. 262.
Verbesina lanulosa Villarreal & A.E. Estrada, E.E. 22377.
Verbesina microptera DC., M.S. 585.
Verbesina olsenii B.L. Turner, M.S. 163.
Vernonia greggii A. Gray var. *greggi*, E.E. 21135; M.S. 1377.
Vernonia obtusa (Gleason) S.F. Blake var. *obtusa*, M.S. 1358.
Viguiera cordata (Hook. & Arn.) D'Arcy, M.S. 840.
Wedelia acapulcensis Kunth var. *hispida* (Kunth) Strother, E.E. 21040, 21105, 21253, 21822.
Xanthium strumarium L., E.E. 21035, 21082.
Zinnia peruviana L., E.E. 21045, 21084.
Zinnia juniperifolia (DC.) A. Gray, M.S. 1407.
- Basellaceae**
Anredera scandens (L.) Moq., E.E. 21484.
- Begoniaceae**
Begonia gracilis Kunth, E.E. 21114a.
Begonia uniflora S. Watson, E.E. 21114.
- Berberidaceae**
Berberis eutriphylla (Fedde) C.H. Mull., M.S. 896.
Berberis gracilis Benth, var. *madrensis* Marroq., E.E. 21878.
Berberis trifoliolata Moric., M.S. 621.
- Bignoniaceae**
Chilopsis linearis (Cav.) Sweet, E.E. 20987, 21832.
Tecoma stans (L.) Juss. ex Kunth, E.E. 21137, 21676.
- Boraginaceae**
Antiphytum heliotropioides DC., M.S. 1577.
Cordia boissieri A. DC., M.S. 234.
Ehretia anacua (Terán & Berl.) I.M. Johnst., E.E. 21090.
Hackelia leonitis I.M. Johnst., M.S. 293.
Heliotropium angiospermum Murray, E.E. 21218.
Heliotropium torreyi I.M. Johnst., E.E. 21056, 21224.
Lithospermum calycosum (J.F. Macbr.) I.M. Johnst., M.S. 1570.
Omphalodes cardiophylla A. Gray ex Hemsl., E.E. 21873.
Tiquilia canescens (DC.) A.T. Richardson, M.S. 1450.
Tiquilia greggii (Torr. & A. Gray) A.T. Richardson, M.S. 1548.
- Brassicaceae**
Cardamine auriculata S. Watson, E.E. 21750.
Diplotaxis muralis (L.) DC., E.E. 21701.
Eruca sativa Mill., M.S. 1226.
Erysimum capitatum (Douglas) Greene, E.E. 21759.

- Lepidium virginicum* L., E.E. 21712; M.S. 1013.
Lesquerella berlandieri S. Watson, E.E. 21716.
Lesquerella lasiocarpa (Hook. ex A. Gray) S. Watson, M.S. 893.
Lesquerella purpurea (A. Gray) S. Watson, E.E. 21779.
Rorippa nasturtium-aquaticum (L.) Hayek, E.E. 21440, 21814.
Sisymbrium auriculatum A. Gray, M.S. 801, 1168.
Sisymbrium irio L., E.E. 21728, 21840.

Cactaceae

- Cylindropuntia cholla* F.A.C. Weber, M.S. 1314.
Cylindropuntia imbricata (Haw.) F.M. Knuth, M.S. 705, 898.
Cylindropuntia kleiniae (DC.) F.M. Knuth, M.S. 29.
Cylindropuntia leptocaulis (DC.) F.M. Knuth, E.E. 21767.
Echinocactus platyacanthus Link & Otto, M.S. 1242.
Echinocereus parkeri, N.P. Taylor, M.S. 744.
Echinocereus rayonesensis N.P. Taylor, M.S. 746.
Echinocereus pentalophus (DC.) Rümpler, M.S. 716.
Echinocereus stramineus (Engelm.) Rümpler, M.S. 31.
Ferocactus glaucescens (DC.) Britton & Rose, M.S. 1315.
Ferocactus hamatacanthus (Muhl.) Britton & Rose ssp. *sinuatus* (A. Dietr.) N.P. Taylor, E.E. 21766, 66.
Ferocactus pilosus (Galeotti) Werderm., M.S. 1620.
Glandulicactus uncinatus (Galeotti ex Pfeiff.) Backeb., M.S. 1316.
Mammillaria chionocephala J.A. Purpus, M.S. 1445.
Mammillaria formosa Galeotti ex Scheidw ssp. *formosa*, M.S. 1475.
Mammillaria melanocentra Poselg. ssp. *linaresensis* (R. Wolf & F. Wolf) D.R. Hunt, M.S. 1472.
Mammillaria prolifera (Mill.) Haw. ssp. *arachnoidea* (D.R. Hunt) D.R. Hunt, M.S. 1441.
Mammillaria winterae Boed., M.S. 1550.
Opuntia cantabrigensis Lynch, M.S. 679.
Opuntia engelmannii Salm-Dyck ex Engelm., M.S. 655.
Opuntia robusta L.H. Wendl., M.S. 1569.
Opuntia stenopetala Engelm., M.S. 1484.
Opuntia stricta Haw. ssp. *stricta*, M.S. 1473.
Selenicereus spinulosus (DC.) Britton & Rose, E.E. 21482.
Thelocactus tulensis (Poselger) Britton & Rose, M.S. 1446.

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- Lobelia calcarea* Wimm., E.E. 21492.
Lobelia cardinalis L. ssp. *graminea* (Lam.) McVaugh, E.E. 21922.
Lobelia ehrenbergii Vatke, M.S. 405.
Lobelia fenestralis Cav., M.S. 418.
Lobelia sublibera S. Watson, E.E. 21132, 21143; M.S. 405, 418.

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- Celtis laevigata* Willd., E.E. 21773.
Celtis pallida Torr., E.E. 21770.

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- Arenaria oresbia* Greenm., M.S. 1557.
Drymaria glandulosa Persl., M.S. 1587.
Drymaria aff. *laxiflora* Benth., E.E. 21734.
Silene laciniata Cav., E.E. 20925.

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- Mortonia palmeri* Hemsl., E.E. 20926.
Schaefferia cuneifolia A. Gray, M.S. 1229.

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- Polanisia dodecandra* (L.) DC., E.E. 21134, 258.

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- Convolvulus equitans* Benth., M.S. 1471.
Cuscuta indecora Choisy, E.E. 21769.
Dichondra argentea Humb. & Bonpl. ex Willd., E.E. 21700.
Dichondra brachypoda Wootton & Standl., E.E. 21699.
Evolvulus alsinoides L. var. *hirticaulis* Torr., E.E. 21066, 21091.

- Evolvulus sericeus* Sw., E.E. 21205.
Ipomoea capillacea (Kunth) G. Don, M.S. 1096.
Ipomoea cardiophylla A. Gray, M.S. 1443.
Ipomoea coccinea L., E.E. 21208.
Ipomoea jalapa (L.) Pursh, M.S. 1588.
Ipomoea pubescens Lam., M.S. 1557.
Ipomoea purpurea (L.) Roth, M.S. 520.

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- Echeveria turgida* Rose, M.S. 1576.
Sedum calcicola B.L. Rob. & Greenm., E.E. 21929.
Sedum greggii Hemsl., M.S. 1564.
Sedum palmeri S. Watson, M.S. 1591.
Sedum wrightii A. Gray, M.S. 811.
Villadia cucullata Rose, M.S. 1330.

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- Cucurbita foetidissima* Kunth, E.E. 21928.
Cucurbita maxima Duchesne, M.S. 252.
Cucurbita texana (Scheele) A. Gray, M.S. 1590.
Ibervillea lindheimeri (A. Gray) Greene, E.E. 21748.
Melothria pendula L., E.E. 21479.

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- Diospyros texana* Scheele, M.S. 704.

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- Arbutus xalapensis* Kunth, M.S. 258.
Comarostaphylis polifolia (Kunth) Zucc. ex Klotzsch, M.S. 1454.

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- Acalypha dioica* S. Watson, E.E. 21927.
Acalypha lindheimeri Müll. Arg., E.E. 21131, 21173, 21200, 21740; M.S. 23.
Acalypha monostachya Benth., E.E. 21074; M.S. 1287.
Argythamnia neomexicana Müll. Arg., E.E. 21630, 21657.
Bernardia myricifolia (Scheele) Benth. & Hook., E.E. 21753, 64.
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Croton fruticosus Engelm. ex Torr., E.E. 21911.
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Euphorbia campestris Schlttdl. & Cham., E.E. 21073.
Euphorbia cinerascens Engelm., E.E. 21030.
Euphorbia dentata Michx., E.E. 21055.
Euphorbia greggii Boiss., E.E. 21068.
Euphorbia hexagona Nutt. ex Spreng., E.E. 21050.
Euphorbia hirta L., E.E. 21099, 21273.
Euphorbia neilmulleri M.C. Johnst., E.E. 2125.
Euphorbia nutans Lag., E.E. 21155.
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Euphorbia schiedeana Mayfield, E.E. 21225, 21269.
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Acacia roemeriana Scheele, E.E. 21856, 36.
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- Astragalus greggii* S. Watson, M.S. 1147.
Astragalus hypoleucus S. Schauer, E.E. 21720.
Bauhinia macranthera Benth. ex Hemsl., E.E. 21828.
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Caesalpinia mexicana A. Gray, E.E. 21104.
Calliandra eriophylla Benth., M.S. 1444.
Calliandra conferta Benth., M.S. 1559.
Canavalia villosa Benth., M.S. 1522.
Centrosema virginianum (L.) Benth., E.E. 21226.
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Cologania broussonetii (Balb.) DC., E.E. 21126, 21150.
Cologania pallida Rose, M.S. 1131.
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Crotalaria mollicula Kunth, E.E. 21094, 21148, 21175, 21267.
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Dalea capitata S. Watson var. *lupinocalyx* Barneby, E.E. 21827; M.S. 1195.
Dalea greggii A. Gray, M.S. 1460.
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Dalea nana S. Schauer var. *carnescens* (Rydb.) Kearney & Peebles, M.S. 1518, 1565.
Dalea saffordii (Rose) Bullock, M.S. 1202.
Dalea scandens (Mill) R.T. Clausen var. *paucifolia* (J.M. Coult.) Barneby, E.E. 21037, 21227.
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Desmodium neomexicanum A. Gray, M.S. 1161.
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Phaseolus albiflorus Freytag & Debouck, E.E. 21168.
Phaseolus leptostachyus Benth. var. *leptostachyus*, E.E. 21736; M.S. 1573.
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Phaseolus vulgaris L., E.E. 21241.
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Rhynchosia minima (L.) DC., M.S. 276.
Rhynchosia senna Gillies ex Hook. & Arn. var. *angustifolia* (A. Gray) Grear, E.E. 21139; M.S. 1532
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- Garrya laurifolia* Hartw. ex Benth., E.E. 21898.
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- Gentianaceae**
- Centaurium calycosum* (Buckley) Fernald var. *calycosum*, E.E. 21802; M.S. 1364.
- Geraniaceae**
- Erodium cicutarium* (L.) L'Hér. ex Aiton, M.S. 729.
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Carya ovata (Mill.) K. Koch, M.S. 1456.
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Hedeoma palmeri Hemsl., M.S. 681, 966.
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- Cobaea pringlei* (House) Standl., M.S. 1296.
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- Ceanothus fendleri* A. Gray, M.S. 1032.
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Cowania mexicana D. Don, M.S. 1350.

- Crataegus rosei* Eggl. var. *parrayana* (Eggl.) J.B. Phipps., M.S. 1170.
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Galium pringlei Greenm., M.S. 1600.
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Casimiroa pringlei Engl., M.S. 798.
Decatropis bicolor (Zucc.) Radlk., M.S. 239, 648.
Esenbeckia berlandieri Baill., M.S. 1417.
Heliopsis parvifolia (A. Gray) Benth., E.E. 21652, 21793.
Ptelea trifoliata L., E.E. 21825a.
Ruta graveolens L., E.E. 21432.
Zanthoxylum fagara (L.) Sarg., M.S. 229, 237.

Salicaceae

- Salix jaliscana* M.E. Jones, E.E. 21862.
Salix nigra Marshall, E.E. 21861.
Xylosma flexuosa (Kunth) Hemsl., E.E. 21197, 21232, 21483.

Sapindaceae

- Cardiospermum halicacabum* L., E.E. 21249.
Dodonaea viscosa Jacq., E.E. 21775.
Neopringlea integrifolia (Hemsl.) S. Watson, E.E. 21198, 21254.
Serjania brachycarpa A. Gray ex Radlk., M.S. 868.
Thouinia villosa DC., E.E. 21106.
Ungnadia speciosa Endl., M.S. 285, 649.
Urvillea ulmacea Kunth, M.S. 806.

Scrophulariaceae

- Buddleja cordata* E.M. Norman, M.S. 976.
Buddleja cordata ssp. *tomentella* (Standl.) E.M. Norman, M.S. 933.
Buddleja marrubiifolia Benth., M.S. 57, 612.
Buddleja parviflora Kunth, M.S. 1194.
Buddleja scordioides Kunth, M.S. 1339.
Leucophyllum frutescens (Berland.) I.M. Johnst., M.S. 1213.

Solanaceae

- Bouchetia erecta* DC. ex Dunal, M.S. 1479.
Capsicum annuum L. var. *minus* (Fingerh.) Shinnars, M.S. 1414.
Cestrum anagyris Dunal, M.S. 1467.
Datura inoxia Mill., E.E. 21053.
Datura meteloides Dunal, M.S. 1437.
Datura stramonium L., E.E. 21108.
Lycium leiospermum I.M. Johnst, E.E. 21608.
Nicotiana glauca Graham, E.E. 21598.
Nicotiana plumbaginifolia Urb., E.E. 21868.

Nicotiana trigonophylla Dunal, E.E. 21664, 21744, 21838.
Physalis hederifolia A. Gray, E.E. 21252.
Physalis philadelphica Lam., M.S. 1360.
Physalis viscosa L., E.E. 21034, 21824.
Solanum eleagnifolium Cav., M.S. 965.
Solanum erianthum D. Don, E.E. 21558.
Solanum nigrescens M. Martens & Galeotti, M.S. 1269.

Staphyleaceae

Staphylea pringlei S. Watson, E.E. 21506.

Sterculiaceae

Melochia pyramidata L., E.E. 21092.
Waltheria indica L., E.E. 21026.

Urticaceae

Boehmeria cylindrica (L.) Sw., M.S. 1400.
Parietaria pennsylvanica Muhl., E.E. 21873a.
Urtica chamaedryoides Pursh, E.E. 21854a; M.S. 1334.
Urtica gracilentata Greene, M.S. 1334.

Verbenaceae

Aloysia gratissima (Gilles & Hook) Tronc., M.S. 915.
Aloysia macrostachya (Torr.) Moldenke, E.E. 21614.
Bouchea prismatica (L.) Kuntze, E.E. 21109a.

Glandularia bipinnatifida (Nutt.) Nutt., M.S. 934.
Glandularia elegans (Kunth) Umber var. *elegans*, M.S. 949.
Lantana camara L., E.E. 21044; M.S. 867.
Lantana horrida Kunth, E.E. 21044.
Lantana macropoda Torr., E.E. 21042.
Lantana velutina M. Martens & Galeotti, M.S. 58.
Phyla incisa Small, M.S. 2.
Priva mexicana (L.) Pers., E.E. 21164.
Verbena canescens Kunth var. *canescens*, E.E. 21709 M.S. 1131.
Verbena carolina L., M.S. 964.

Violaceae

Hybanthus verbenaceus (Kunth) Loes., E.E. 21165; M.S. 459.
Hybanthus verticillatus (Ortega) Baill., M.S. 28.
Viola sororia Willd., M.S. 835.

Vitaceae

Parthenocissus quinquefolia (L.) Planch., E.E. 21179, 21428.
Vitis berlandieri Planch., M.S. 1333.
Vitis cinerea Engelm., E.E. 21436, 21876.

Zygophyllaceae

Kallstroemia hirsutissima Vail, E.E. 21202.
Kallstroemia parviflora Norton, M.S. 9.

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